Electronic Supplementary Information (ESI)

3D Nanoweb of Zeolitic Imidazole Framework in Microfluidic System for

Multifarious Catalytic Applications

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Figure S1. CFD simulation of the microreactor embedded with Si pillars.

Figure S2. Correlation between the number of CNT strands and the inter-micropillar distances. The number of CNT strands between two micropillars with a diameter of 2.5 μ m was counted. The inter-micropillar distances are ranging from 1 to 10 μ m.



Figure S3. SEM images of (a) cross view, (b) 45° tilt view and (c) top view of CNT 3D networks on micropillars (100 µm height). The silicon pillars were not uniformly etched along the column upon taller than 80 µm, due to limited fabrication process. The pillar diameter and the pillar gap were severely different at the top and the bottom part, although the CNTs were uniformly synthesized to suspend across the pillars from the top to the bottom part.



Figure S4. (a) The overall design of the micropillar-embedded microchannel. SEM images of (b) tilted view of the micriopillar-embedded microchannel and (c) cross-sectional view of the micriopillars.



Figure S5. (a) SEM image of strands of CNT networks. (b) SEM images of CNT networks on micropillar (left) before the use and (right) after the water flow with a flow rate up to 100 μ L/min for 60 min.



Figure S6. Comparison of the XRD patterns of the ZIF-8 film on Si wafer and the simulated one.



Figure S7. EDS results for ZIF-8 3D nanoweb

Figure S8. SEM images of the comparative system with the immobilized ZIF-8 without CNT networks.

Figure S9. Bonding method using an uncured thin layer of PDMS as an adhesive inspired by the microcontact printing method.

Table S1. Comparison of the conversion of Knoevenagel condensation between this work and

 previous reported ones.

Reactor	Catalyst	Residence time	Conversion	Temp.	Ref.
ZIF-8 3D nanoweb microfluidic system	ZIF-8 on CNT nanoweb	17.5 s	Fully conversion	RT	This study
ZIF-8 on micropillar microfluidic system	ZIF-8 on Si micropillars	35 s	Fully conversion	RT	This study
Batch system	ZIF-8 powder	6 h	Fully conversion	25 °C	1
Batch system	ZIF-8 powder	4 h	57 %	RT	2
Batch system	ZIF-8 powder	4 h	91 %	RT	2
Batch system	ZIF-8 powder	3 h	Fully conversion	RT	3
Batch system	ZIF-8 powder	24 h	99.4 %	30 °C	4
Batch system	ZIF-8 powder	24 h	88.6 %	30 °C	4
Batch system	ZIF-8 powder	24 h	91 %	30 °C	4

References:

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